

Hisatsugu ANDO*: **Tutigaea, a new genus of Hypnaceae**
from Japan**

安藤久次*: 日本産ハイゴケ科の新属 *Tutigaea* について**

In 1915-16, Warnstorf published *Stereodon plicatus* basing on the material collected by K. Sakurai at Hakone, Japan. In spite of the valid publication, this species failed to be cited in Brotherus' 2nd edition (1924-'25) of the Musci in Engler & Prantl's *Natürlichen Pflanzenfamilien*. Afterward, Reimers & Sakurai (1931) referred to this species and transferred it to the genus *Hypnum*, and this treatment was adopted in recently published Sakurai's "*Muscologia japonica* (1954)" in which he followed the system of Brotherus (1924-'25). Judging from the original description and drawing made by Warnstorf, however, it seemed to me unreasonable to place the species under *Hypnum* sensu Brotherus (1925). Fortunately I could examine its isotype specimen preserved in the herbarium of the National Science Museum in Tokyo and could confirm actually that the species was sharply distinct from *Hypnum* and moreover, I realized that it was a very curious moss. Subsequently, I discovered the important fact that *Stereodon plicatus* appeared to be identical with *Stereodon brachytheciella* Broth. et Par. which had been described in 1902 from material collected by U. Faurie on Mt. Ichifusa, Japan, so this discovery presented me with a puzzling problem. The original description of *S. plicatus*, as far as the vegetative characters are concerned, conforms well to that of *S. brachytheciella*, and this was really true on comparison of the two isotypes. The descriptions of the sporophytes, however, are considerably different, namely, for *S. plicatus* it reads, "Capsula ovata, erecta, seta 4-6 mm. longa, —", while for *S. brachytheciella* "Capsula (una!) pallide lutea piliformis ovata, ore minuto, 2.5 mm. longa in pedicello rubro levi 20 mm. alto inclinata, —". As the peristome characters are lacking in *S. brachytheciella*, the two cannot be compared with each other in this respect. As to the sporophyte of *S. plicatus* I could actually see, by an examination of the isotype, that the capsule is really erect and 0.7-1.5 mm. long excl. operculum and the seta is very short ranging from 3 to 6 mm. long, but in the isotype of *S. brachytheciella* (preserved in Herb. Kyoto Univ.) I could see no evidence concerning the sporophyte character as it was

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completely sterile. At any rate, it seems to be clear from studies in the gametophytic morphology of the isotype specimens that the two species are conspecific, as will be clearly evident to anyone who sees the illustrations here presented (Fig. 1). To solve the problem concerning the sporophyte, I should like to offer a supposition that the original description of the sporophyte in *S. brachytheciella* might perhaps have been based on an extreme or unusual form, or been taken mistakenly from the sporophyte of another moss which happened to be mixed in the same packet.

With respect to *S. brachytheciella*, Brotherus (1908) remarked in the 1st edition of the Musci in Engler & Prantl, "*Stereodon brachytheciella* Broth. et Par. in Japan weicht durch zahlreiche, quadratische Blattflügelzellen von allen Arten der Gattung (note by Ando: *Stereodon* sensu ampl., including *Stereodon*, *Hypnum*, *Breidleria*, *Heterophyllum*, *Brotherella*, etc. sensu Brotherus 1925) bedeutend ab und erinnert in der Tracht gang an einigen Brachythecien, die Blattrippe ist jedoch doppelt. Ohne gute sporogone lässt sich die Frage ob sie als besondere Gattung abzutrennen wäre nicht entscheiden." I do not know why this species was not cited anywhere in Brotherus' 2nd edition of the Musci in Engler & Prantl despite of the fact it had attracted his attention to such an extent in the 1st edition. At any rate, it seems true that Brotherus felt some doubt about the taxonomic position of this species. The species, under the name of *brachytheciella*, was not cited in Sakurai's "*Muscologia japonica* (1954)." The only literature referring to this species, besides Brotherus' 1st edition of the Musci in Engler & Prantl, is Ihsiba's "*Zoku Nipponsan Senrui Sosetsu* (1932)" in which he treated it as *Hypnum brachytheciellum*.

As already mentioned, this species has no particular affinity with *Hypnum* (sensu strict.) and the treatment as a species of *Hypnum* is not acceptable. It differs from *Hypnum* in the irregular and almost non-pinnate ramification, the lanceolate leaves with wider insertion and far looser areolation, and the erect capsule with a very short seta, the last mentioned being the most striking distinguishing feature. It seems to me that the species should rather possibly be referred to the subfamily Hypnoideae in the family Hypnaceae (sensu Brotherus 1925), but it represents a well-defined entity which is distinctly separated from any known genus of the subfamily. In its erect capsules, this species appears to have some relation to the genus *Stereodon* sensu strict., but obviously differs in the narrower and more gradually acuminate leaves, the plicate lamina, the shorter (non-cylindric) capsule and the development of cilia in endostome. These peculiar characters make it impossible to place the species under any known genus in the Hypnaceae as well as other families. Therefore I should

like to propose a new genus with this species as follows.

Tutigaea Ando, gen. nov.

Caulis repens, radiculosus, irregulariter ramosus, ramis simplicibus vel divis, vix complanatis. Folia omnia subsecunda, caulina lanceolata, falcata, longe acuminata, concaviuscula, plicata, integerrima vel ad apicem obsolete denticulata, haud decurrentia, nervis binis, indistinctis raro distinctis; cellulis medianis linearibus vel anguste rhomboideis, laevibus, alaribus numerosis, quadratis. Folia ramea paulo majora, profundius plicata, ceterum similia. Folia perichaetia intima parva, lanceolata, longe acuminata, paulo plicata, fere integerrima, enervia. Seta brevis, laevis, siccitate dextrorsum. Capsula erecta, ovata, fusci-lutea. Peristomium perfectum, exostomii dentes subulato-lanceolati, pellucido-flavescentes, dorso transverse striati, superne hyalini et minute papilloso, ventro valide trabeculati, endostomium pellucidum, tenuissime papillosum, dentibus carinatis, sursum angustissime rimosis, cilia singularia, nodosa; operculum ignota. Sporae flavae, subtiliter asperae.

Species typica: *Tutigaea brachytheciella* (Broth. et Par.) Ando. The genus is named in honor of Mr. Yasuhira Tutiga who is a keen Japanese naturalist and has influenced in several ways the progress of my bryological studies.

Tutigaea brachytheciella (Broth. et Par.) Ando, comb. nov.

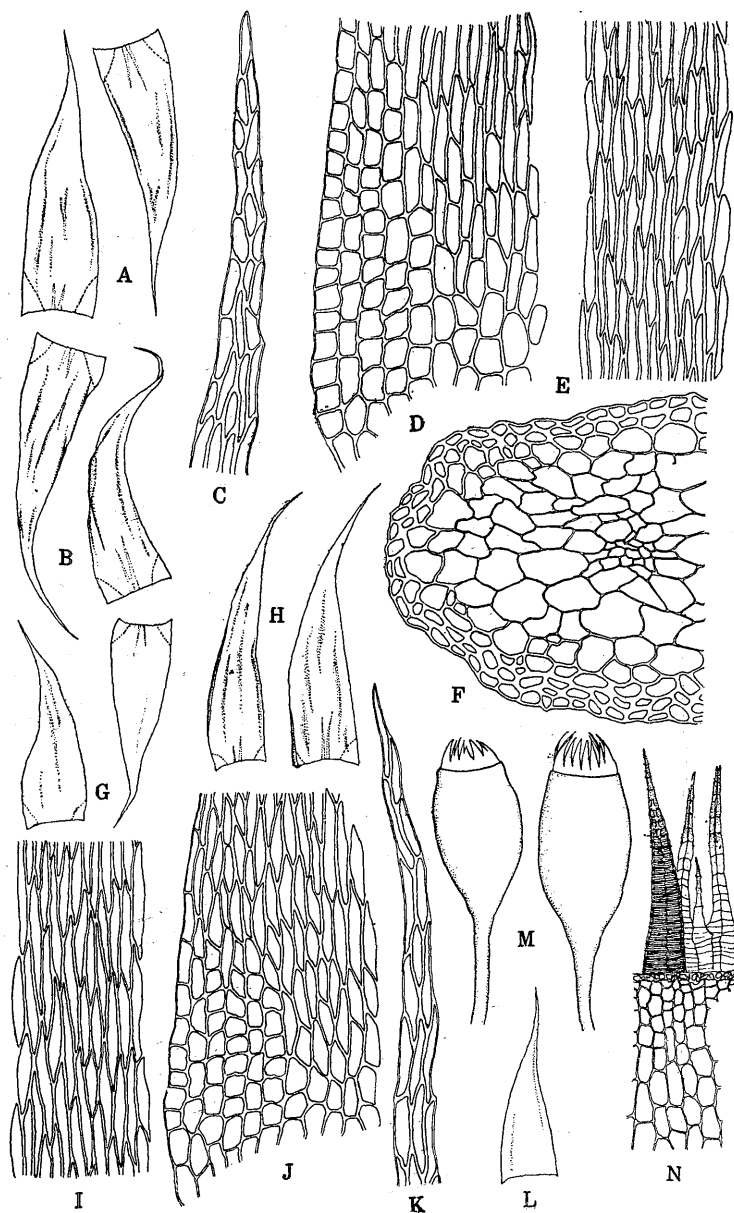
Stereodon brachytheciella Broth. et Par. in Bull. Herb. Boiss. 2 ser. **11**: 989 (1902); Broth. in Engl. Pflanzenfam. ed. 1, Musci 1074 (1908).

Hypnum brachytheciellum Ihsiba, Zoku Nipponsan Senrui Sosetsu 82 (1932).

Stereodon plicatus Warnst. in Hedwigia **57**: 125, figs. 1-4 (1915-16).

Hypnum plicatum Reim. et Sakurai in Bot. Jahrb. **64**: 557 (1931); Sakurai, Mus. Japonica 162, pl. 56-r, pl. 63-a (1954).

Plants densely tufted usually on bark, of medium size, greenish-yellow, suggestive of a *Brachythecium*. Stems prostrate, to 2 cm. long, radiculose, lower parts growing in close contact to substratum; in cross-section cortical cells 2-3 seriate, thick-walled, colored with light yellow, medullary cells larger, hyaline, thin-walled, central strand differentiated; irregularly or subpinnately once- or twice-branched, branches closely and somewhat cylindrically foliate, 3-10 mm. long and 0.6-0.9 mm. wide with leaves, very rarely slender and flagelliform. Leaves subsecund, stem-leaves straight or slightly falcate, lanceolate, widest at or near the insertion, not decurrent, gradually long-acuminate, 1.2-1.7 mm. long and 0.3-0.5 mm. wide, plicate, somewhat concave, margins plane, entire or faintly denticulate above, costa double, usually indistinct; median leaf-cells linear-rhomboidal to linear-flexuose, 60-70 μ long and 5-6 μ wide in



cavity, basal cells shorter but the walls not becoming thicker and porose, alar cells well-defined, quadrate, numerous (10-18 along the margin). Branch-leaves somewhat larger, longer-acuminate, slightly falcate, 1.2-1.9 mm. long and 0.3-0.5 mm. wide, more strongly plicate, other characteristics almost the same as those of the stem-leaves. Perichaetial leaves rather small, lanceolate, gradually acuminate, smooth or slightly plicate, almost entire, costa indistinct. Dioicous.* Seta brownish yellow, very short ranging from 3 to 6 mm. long, smooth, twisted to the right when dry. Capsule brownish-yellow, blackish when old, erect, ovate, 0.5-0.55 mm. thick and 0.75-1.5 mm. long excluding operculum; operculum unknown; exothecial cells rectangular, thin-walled and collenchymatous. Peristome perfect and hypnoid, teeth lance-subulate, yellowish-pellucid, outer surface transversely striate with divisural zigzag, hyaline and papillose above, inner side strongly trabeculate; segments somewhat shorter than the teeth, pale, carinate, split between the articulation above, minutely papillose; cilia single, sometimes rudimentary, nodose, papillose; basal membrane about one-fourth to one-third as high as the segment. Spores yellow, minutely roughened, $15-18\mu$ in diameter.

As seen in figure 2, the size of the plant varies considerably. A specimen collected from Mt. Dogamori, Kochi Pref. is noticeably larger and somewhat different in habit. It shows a comparatively complanate foliation and resembles *Hypnum fujiyamae* (Broth.)

Par. in appearance.

Specim. exam. Honshu. Pref. Iwate: Taneyama (T. Wakawa, no. 2330 in Herb.

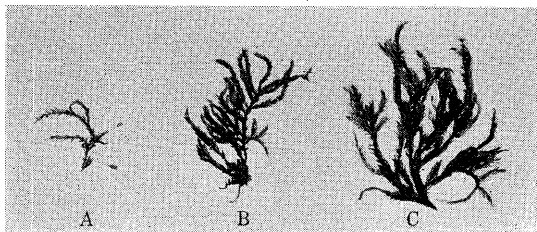


Fig. 2. Plants of *Tutigaea brachytheciella*, natural size. A. Isotype of *Stereodon plicatus*, B. No. 12412 from Mt. Aoidake, Miyazaki Pref., C. No. 13252 from Mt. Dogamori, Kochi Pref.

* Originally described as "dioicous" for *Stereodon brachytheciella* and "autoica" for *S. plicatus*, but my examination of the isotypes has revealed that they are equally dioicous.

Fig. 1. *Tutigaea brachytheciella* (Broth. et Par.) Ando A-F. drawn from isotype of *Stereodon brachytheciella*. A. Stem-leaves, $\times 24$. B. Branch-leaves, $\times 24$. C. Apical part of stem-leaf, $\times 250$. D. Basal angle of do., $\times 250$. E. Median cells of do., $\times 250$. F. Cross-section of stem, $\times 250$. G-N. from isotype of *Stereodon plicatus*. G. Stem-leaves, $\times 24$. H. Branch-leaves, $\times 24$. I. Median cells of stem-leaf, $\times 250$. J. Basal angle of do., $\times 250$. K. Apical part of do., $\times 250$. L. Perichaetial leaf, $\times 24$. M. Capsules, $\times 24$. N. Peristome, $\times 84$.

Nat. Sci. Mus. Tokyo). Pref. Saitama: Mt. Buko, on *Quercus acutissima*, associated with *Fissidens* sp., *Macrosporiella dozyoides* (H. Ando, no. 3400). Pref. Kanagawa: Hakone, on bark (K. Sakurai, no. 1757 in Herb. Nat. Sci. Mus. Tokyo, isotype of *Stereodon plicatus*). Shikoku. Pref. Kochi: Hata-gun, Mt. Dogamori, 510m. alt., on rock wall (H. Ando, no. 13252). Kyushu. Pref. Kumamoto: Mt. Ichifusa, associated with *Fissidens gymnogynus*, *Neckera yezoana*, *Frullania* sp. (U. Faurie, no. 1412 in Herb. Kyoto Univ., isotype of *Stereodon brachytheciella*). Pref. Miyazaki: Mt. Aoidake, 340m. alt., on bark of *Distylium racemosum* (H. Ando, no. 12412).

Range. Endemic to Japan (Honshu, Shikoku, Kyushu).

I wish to express my gratitude to Professor Yoshiwo Horikawa for constant guidance and encouragement. Thanks are also due to Mr. Edwin B. Bartram who kindly read the original manuscript and offered me much valuable advice. For the examination of original specimens, I am indebted to Dr. Yosio Kobayasi of the National Science Museum in Tokyo and Dr. Motozi Tagawa of Kyoto University.

日本産 *Hypnum* 属(ハイゴケ属)を検討中、現在 *Hypnum brachytheciellum* (Broth. et Par.) Ihsiba(コアオギヌゴケ), *H. plicatum* (Warnst.) Reim. et Sakurai(コチリメンゴケ)として取扱われている2種の蘚の isotype 標本を検査する機会を得たが、その結果、両者が同一種であることを確認し、同時にこの蘚が葉や孢子体において非常に特異な形態を示している、これを *Hypnum* 属 (sensu Brotherus 1925) のものとして扱うのは不適当であるということに気がついた。前述の種名は最初それぞれ *Stereodon brachytheciella* Broth. et Par. (1902, 基準標本産地: 市房山), *Stereodon plicatus* Warnst. (1915-16, 基準標本産地: 箱根)として発表されたが、この *Stereodon* は当時は非常に広い意味をもって用いられていた属名である。本種は葉の形や蘚菌の構造から考えて Hypnaceae (ハイゴケ科) の Hypnoideae (ハイゴケ亜科) に入れるのが最も適当のように思われるが、本亜科中では、蒴胞が直立して、しかも蘚菌が内外そろっているという点で *Stereodon* (現在用いられている狭義の) に最も近い。しかし葉がよりせまい披針形でしわが多く、葉の細胞の幅が広いこと、蒴胞がより短くて円柱状にならず、内蘚菌に繊毛 (cilia) をもっていることなどによって異なっている。*Hypnum* 属からは蒴胞が直立している点でまず明らかに区別されるが、その他、外観、葉の形、葉の細胞組織などの諸形質についてもそれと一致しない点が多い。このようにして本種は Hypnoideae 中の既知の属のいずれにもあてることができず、また Hypnoideae 以外のハイゴケ科やその他の科の諸属にもこれをいれるべきものが見当たらないので、ここに新属 *Tutigaea* (ツチガゴケ属)として発表することにした。種名は先行の *brachytheciella* が採用されるので、新組合せは *Tutigaea brachytheciella* (Broth. et Par.) Ando となる。なお種

の和名はこれをツチガゴケと改称したい。

新属名は槌賀安平先生の名を記念したものである。槌賀先生は長い間三重県の諸学校に教鞭をとられて、同地方の教育界に大きな貢献をされたが、同時に三重県の動植物や地質の研究にも努められて多くの立派な業績を残された。特に蘚類に興味をもって研究され、その成果は「三重県産の蘚類 (A List of Mosses from Mie Prefecture, 1940)」その他の論文として発表されている。現在は郷里の淡路島南淡町に近い三原高等学校の講師をつとめられているが、72才の高齢にもかかわらず、なお若い生徒たちと共に山へ登り、マラソンをやり、また教え子たちから贈られて同高校構内に建設された槌賀研究室で研究にも余念がないといったお元氣な活躍ぶりである。

○高等植物分布資料 (4) Materials for the distribution of vascular plants in Japan (4).

○イチゲキスミレ *Viola orientalis* (Maxim.) W. Becker これまで知られていた東限産地は駿河高草山であったが、更に東の駿河天子山、甲斐御坂山にも見つかった。

天子山のものは既に杉本順一氏の「天子山脈の植物」(1954)に田貫沼及び白糸の滝から記録されている。筆者は1956年4月29日に、田貫沼から天子山への登路に当る岐尾根の日当りのよい草地に多生しているのを確認した。同所にはアシタカツツジが生えており、愛鷹山以外の確実な産地である。

御坂山の産地は黒岳附近の尾根上数カ所に少数ずつ生じており、附近はブナ林である。

この産地は、天子岳では尾根のブナ林中には生じておらず、下部の草地にのみ生えている事と比較して興味がある。現在この附近は伐採が進められており、今後うまく生残るかどうかわからない。

本種の分布は中国地方、九州ととび離れており、朝鮮、満洲、支那にも産する。御坂山は日本における東限及び北限である。(金井弘夫)

○ヤマガラシ *Barbarea cochlearifolia* Boiss. 駿河愛鷹山の鋸岳から位牌岳に至る稜線上、高度約1300mの所に唯一カ所だけ生じている(金井弘夫, Jul. 18, 1954 No. 62 58 TI)。この附近はブナの原生林で、尾根は東西に走り、両側は急峻で、特に南側は旧火口に向って急激に落込んでいる。本種は最も近い所では南アルプスの2000m以上の所に生じているのみで、寒冷期の遺存と見られる。個体数は僅かであるから、遠からず見られなくなるのであろう。なおこの種の分布は本州では近江伊吹山以東で、愛鷹山は南限となる。(金井弘夫)

○ホソバジュズネノキ *Damnacanthus lancifolius* (Makino) Koidz. 西日本系の本種は駿河富士郡吉永村桑崎の浅間神社境内に産する。(金井弘夫)